CLAIMS

What is claimed is:

1. A method for distributing at least two gases upstream onto a catalyst, comprising:

a) providing a gas distributor comprising a body having a plurality of channels therethrough and a plurality of outlets from said channels, said outlets configured so as to distribute gas onto the catalyst;

b) feeding a first gas into the gas distributor;

c) feeding a second gas into the gas distributor simultaneously with step b); and

d) allowing the first and second gases to flow through the gas distributor, out through the outlets, and into contact with the catalyst.

2. The method of claim 1 wherein steps b) through d) are carried out such that gases flow across said catalyst at a gas hourly space velocity of at least 20,000 h^{-1}.

3. The method of claim 1 wherein steps b) through d) are carried out such that gases flow across said catalyst at a gas hourly space velocity up to 100,000,000 h^{-1}.

4. The method of claim 1 wherein the gas distributor comprises a plurality of plates that have been etched and bonded together.

5. The method of claim 1 wherein the gas distributor has at least 7 outlets.

6. The method of claim 1 wherein the gas distributor has at least 100 outlets per square inch.

7. The method of claim 1 wherein the gas distributor has at least 1,000 outlets per square inch.

8. The method of claim 1 wherein the gas distributor has at least 2,000 outlets per square inch.

9. The method of claim 1 wherein the first and second gases are combined within the gas distributor such that the gas exiting through the outlets comprises a mixture of the first and second gases.

10. The method of claim 1 wherein the first and second gases are not combined within the gas distributor and the first and second gases are mixed between the outlets and the catalyst.

11. The method of claim 1 wherein the pressure drop across the gas distributor is less than 30 psi.

12. The method of claim 1 wherein each channel has an inlet opening and an outlet opening and ratio of the sum of the areas of the inlet openings to the sum of the areas of the outlet openings is between about 1:2 and 1:10.

13. The method of claim 12 wherein ratio of the sum of the areas of the inlet openings to the sum of the areas of the outlet openings is between about 1:2 and 1:6.

14. The method of claim 1 wherein each channel has at least one change in direction between its inlet and its outlet.

15. The method of claim 1 wherein some channels share an outlet opening.

16. The method of claim 1 wherein some channels share an inlet opening.

17. A process for converting a hydrocarbon-containing feed gas to liquid hydrocarbon products comprising:

a) flowing the hydrocarbon-containing gas and an oxygen-containing gas through a micro-channel gas distributor having a plurality of gas outlets, so as to produce a reactant stream;

b) reacting the reactant stream in a syngas reactor under conditions effective to produce a syngas stream comprising hydrogen and carbon monoxide; and

c) reacting at least a portion of the syngas stream in a synthesis reactor under conditions effective to produce liquid hydrocarbon products.

18. The process according to claim 17 wherein step b) includes keeping the temperature of the reactant gas stream at about 30°C - 750°C, contacting the reactant gas stream with a catalyst, keeping the temperature of the catalyst at about 600-2,000°C, and maintaining the reactant gas stream at a pressure of about 100-40,000 kPa (about 1 - 40 atmospheres) while contacting the catalyst.

19. A reactor system for partially oxidizing a feed gas comprising:

a reactor containing a catalyst; and

a gas distributor comprising a body having a feed gas inlet, an oxygen inlet, a plurality of channels therethrough, and a plurality of outlets from said channels for distributing gas across said catalyst, said gas distributor including a manifold for receiving gases from the feed gas inlet and the oxygen inlet and distributing said gases into said channels in a desired manner;

wherein said outlets distribute a mixture of feed gas and oxygen onto the catalyst.

20. The method according to claim 18 wherein said feed gas comprises a light hydrocarbon.

21. The reactor system according to claim 18 wherein said feed gas comprises H_2S.

22. The reactor system of claim 18 wherein the gas distributor comprises a plurality of plates that have been etched and diffusion bonded together.

23. The reactor system of claim 18 wherein the gas distributor has at least 7 outlets.

24. The reactor system of claim 18 wherein the gas distributor has at least 100 outlets per square inch.

25. The reactor system of claim 18 wherein the gas distributor has at least 2,000 outlets per square inch.

26. The reactor system of claim 18 wherein the gas distributor is configured such that the feed gas and the oxygen-containing gas are combined within the gas distributor such that the gas exiting through the outlets comprises a mixture of the feed gas and the oxygen-containing gas.

27. The reactor system of claim 18 wherein the gas distributor is configured such that the feed gas and the oxygen-containing gas are not combined within the gas distributor and the feed gas and the oxygen-containing gas are mixed between the outlets and the catalyst.

28. A method of partially oxidizing a feed gas comprising:

a) providing a reactor containing a catalyst;

b) providing a gas distributor comprising a body having a plurality of channels therethrough, and a plurality of outlets from said channels for distributing gas across the catalyst;

c) feeding the feed gas into the gas distributor;

d) feeding an oxygen-containing gas into the gas distributor simultaneously with step c); and

e) allowing the feed gas and the oxygen-containing gas to flow through the gas distributor and out through the outlets into contact with the catalyst;

whereby a product mixture containing CO and H_2 is produced.